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NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS.

Technical Memorandum No. 20

SIXTH MEETING OF THE MEMBERS

of the

GERMAN SCIENTIFIC ASSOCIATION FOR AERONAUTICS.

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SIXTH MEETING OF THE MEMBERS
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GERMAN SCIENTIFIC ASSOCIATION FOR AERONAUTICS.

The Sixth Meeting of the members of the above-named Association was held in Berlin, from the 13th to the 17th of October, 1920.

During the scientific part of the proceedings, extremely interesting lectures were given and were further explained by the aid of photographs, films and practical representations.

Major v. TSCHUDI gave a "Report on the fulfillment of the Peace Treaty in so far as German Aviation is concerned." The brief allusion made to various points may be summed up by the statement that while the Treaty of Versailles would be executed in the most loyal spirit by Germany, every effort would be made to have it mitigated in the interests of the continued existence of German Aviation.

The communication most highly appreciated was to the effect that the main portion of the Inter-Allied Aircraft Control Commission intended to leave Germany at no distant date. Major v. TSCHUDI added that he hoped that that time would soon come, as it would mark the re-commencement of aircraft industry.

Dr. A. WIGAND spoke on the subject of "Aerological and Aero-Electric Flights and their Significance with regard to Aviation." He described the utilization of the airplane as a new means of investigating aerological and aero-electric conditions,

and drew attention to the advantages that may be conferred on aviation by such research work in the field of the air, through scientific flights. The investigations hitherto made have rendered it possible to study disturbances in aerological measurements, and to avoid such disturbances on the airplane itself, so that the meteorological conditions of free air can now be faultlessly registered in the airplane, even at high altitudes. It is thus possible to obtain the precise values of flight efficiency for airplanes and airships, and at the same time to utilize the qualities of the atmosphere to the utmost and best extent. Aero-electric study flights were successfully carried out up to an altitude of 5.2 km., with the main object of investigating the ionization of the atmosphere. The work is now to be applied to the study of the other aero-electric elements. The practical importance of the tests, as affecting the aviator, consists chiefly in the possibility of analyzing risks now incurred through electricity, especially in the neighborhood of thunderstorms, by airships and captive balloons; also in solving questions of great importance concerning wireless telegraphy.

The lecturer concluded his interesting address with an appeal for the aid of all German authorities and manufacturers desirous of promoting such work.

"The Latest Advance in the Field of Wireless Telegraphy and Telephony, particularly in respect of Overseas Communication," was the subject taken up by Major SOLFF, Director of the Wire-

less Telegraphy and Trans-Radio Companies.

Major SOLFF laid special stress on the advantages gained for aviation by the latest achievements in that line. The final impetus to the transition from "damped oscillations by means of tuned quenched spark transmitters" to "non-damped oscillations by arc-lamps, high frequency machines and cathode tubes" was given by the experiences of the war. The principal advantages are:-

1. Diminution of mutual derangements at wireless stations.
2. Increased sensibility and acuteness of pitch of the receiver and its efficiency.
3. Increased efficiency of the transmitter, of its wave zone and of the radial efficiency of the antenna.
4. Possibility of mechanical express transmission, of automatic Duplex express reception and of wireless telephony.

All these are of particular benefit to aviation on account of their facilitating communication between aircraft during flight and between such aircraft and the ground. The earlier antenna with long, hanging wires is now replaced by framed antenna, which can also be utilized for sounding, in consequence of "directing efficiency" (Richtwirkung), and is therefore helpful in navigating and adjusting the direction of aircraft. The construction of the State Wireless System is of interest to aviators with regard to weather and time signal service.

The speaker then alluded to the general importance of overseas communication, and gave an outline of the chief stations

already existing and those in course of construction, with photographic views. The newly opened station at Nauen, thus described, gave a vivid impression of the overwhelming importance of that station, as regards progress, and of the extension of its scope due to the new high frequency machines.

Director DREXLER, Engineer, then lectured on "MODERN FLIGHT INSTRUMENTS FOR TAKING FLIGHT BEARINGS." "Navigation" is essentially a subject which must be studied by the pilot before he begins to fly, and in order to do this, he must first have a thorough knowledge of the instruments used for determining the direction of flight and bearings, and be able to use them skillfully. All that may be said concerning the navigation of a ship applies in a still more marked degree to aircraft, as air is usually a far less reliable element than water. In addition to this, the pilot must master three dimensions in the air. The flight instruments now in current use do not fulfill all our needs. The instruments of the future must be so constituted that the pilot is able, by their adjustment, to find his bearings in absolute independence of meteorological conditions, and with equal facility when flying in mist, in clouds or when the ground is no longer visible. By this means alone can he attain the assurance in piloting that must be demanded of him as the pilot of a transport airplane. In other countries, certain precautions have already been taken as regards flight instruments. In England, for instance, the instruments on every airplane must

be checked for reliability by a controlling engineer in the service of the Government, before starting to fly.

The speaker then classed the instruments which should be produced at an early date under three main headings: instruments for measuring the forces of the earth and of the air, and original force. The most important conditions with regard to these instruments are as follows: light weight, need for small space only, and the easiest possible reading and manipulation, as far as possible without any need for service or special maneuvers. In constructing them, the high speed of the airplane, the considerable influence of flight and of centrifugal acceleration and retardation, and the extremely short time at the disposal of the pilot for adjustment must all be taken into consideration. The pilot must be kept informed, by means of these instruments, of the position of his machine in space or in relation to the earth, the direction of flight, flying speed and altitude of flight. He must also be able to determine, by readings, the position of the three principal axes - that is, the longitudinal axis, the transverse axis, and the horizontal axis - in space. A modern flight instrument was then shown, and Director DREXLER gave an explanation as to its utility and efficiency. Last of all, the application of the gyroscope principle to flight instruments was described, and it was stated that the flight instruments of the future must be constructed in such a manner as to influence the controlling of the airplane directly.

Dipl. Engineer KLEMPERER gave some further information on the sailing-flight problem in his "Report on the Gliding and Sailing Flight Competition in the Rhon." This competition was arranged by the Association of German Model-Flight and Gliding-Flight Societies, from June 15, to July 31, 1920, with a view to throwing more light on the much discussed question of sailing flight with the engine stopped, and also to incite these interested in sailing flight as a sport to compete with each other and express their opinions on the subject.

The site was chosen on account of its being particularly suitable for flight experiments with stopped engines. The result of the competition has since been published in all the aeronautical publications.

The lecturer gave some details about the airplanes employed, and said that many of them did not come up to the standard of up-to-date technics. It was, however, one of the ideas entertained in getting up the competition that such airplanes should be made an example of, and that warnings should be given against defective improvisations. In constructing gliding flight airplanes, the rules laid down for the construction of airplanes with engines need only be enforced regarding minimum weight, highest possible utilization of material, the avoidance of non-lifting resistance and good flying qualities. The airplane made by the Aeronautical Association at Aachen, which best embodies the above conditions, was then fully described from a structural point of view. It also came out first in the competition.

The whole proceedings were so successful on that occasion, that there is every reason to hope a similar competition may be arranged for this year and as a regular institution in future.

Major PARSEVAL, Prof. Dr. Eng., then gave an address on "The Formation of Eddies on Lifting Surfaces." He said that the eddies found at the ends of the lifting surfaces of an airplane are always found in pairs and revolving in opposite directions. Examination shows that they drift slowly downward and increase greatly through taking in air from the rear, whereby the air surrounding the eddy also takes part in the revolution. In so doing, the energy contained decreases considerably.

The Helmholtz theory with regard to frictionless fluid, which gives the eddy as a stationary phenomenon which cannot end in free fluid, should be applied to actual fluids in the sense that the eddy certainly terminates in the free fluid, but that it soon disperses. The eddy is the dispersing process of the energy which is mainly produced in the form of forward movement by the surfaces in the air. This energy moves circularly in the eddy and is then transformed into heat through inner friction in the air. The direct influence of the eddy on the lifting surface is an unimportant increase in the resistance.

Dipl. Engineer ROHRBACH then spoke about the "Relations between the Working Safety of the Airplane and the Constructional Type of its Power Installation." The test values hitherto observed in aerial transport for the frequency of the various de-

rangements in the motor plant, are assumed to be a basis for data on the working safety of such plant. Comparison by calculating different single-engine and multi-engine aircraft plant, as represented by corresponding curves, gave remarkably different results in the various plants investigated. The practical experiments made so far, which proved the superiority of the supervised engine, have been fully and entirely confirmed by the results obtained by calculation. This shows that the expense of maintaining and renovating airplanes is dependent to a great extent, on the more or less favorable method adopted for the engine plant.

In conclusion, Dr. KOSCHEL, (M.D., D.phil.) formerly Staff Army doctor, made a speech on the "Investigation of Mental Efficiency during a Stay in Rarefied Air." Researches hitherto made in airplanes or airships cannot be said to have given entirely satisfactory results. The human organism is in itself influenced by external conditions, which give the impression of excitement, fear, dizziness, etc. In order to obtain incontestable results, Dr. KOSCHEL carried out his experiments in a pneumatic chamber in which the air was rarefied to a degree corresponding to that of the altitude desired. He made a most careful examination in this chamber, of widely different tasks, calling for the action of the brain and mechanical transmission. The results were recorded with great precision and gave unquestionable proof of the fact that disturbances of the organism, so-called

altitude sickness, begins at about 6500 m. in the case of normal human beings. Here it is that lassitude of the mind, drowsiness and unconsciousness first appear, and these symptoms are partly accompanied by acute pains. In the transition to lower layers of air, the symptoms of derangement again became evident.

On the last day of the proceedings, the ZEPPELIN WORKS AT STAACKEN and the PRINCIPAL WIRELESS STATION at Nauen were visited. The disastrous effects of the Versailles Treaty were most painfully noticeable at Staacken. The once prosperous workshops, in which more than 3000 workmen earned their living, are now a dreary sight, and 200 men only can barely be kept at work on urgent tasks of the most different order. And the sword of Damocles, demolition, hangs over the halls that are a perfect marvel in the way of German technical skill.

THE WIRELESS STATION at Nauen presented a striking contrast to Staacken. Excellent guides were placed at the disposal of the party by the Board of Directors, and it was thus possible to form a distinct impression of the organization of a modern terminal station.

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